III. AMENDMENTS TO THE DRAWINGS

The attached two (2) sheets of drawings in Appendix A include changes to Figures 15 and 25. These sheets, which include Figs. 15 and 25, respectively, replace the original sheets including Figs. 15 and 25.

In Figure 15, modules 1510 and 1512 have switched positions within the feature identification unit 302, in accordance with the description provided at page 32, line 27 to page 34, line 18 of the specification.

In Figure 25, acceleration/deceleration identifiers 'A' and 'D' have been added, in accordance with the description provided at page 38, lines 5-15.

Attachment: Replacement Sheets 14/28 and 22/28
Annotated Sheets 14/28 and 22/28 Showing Changes

IV. REMARKS / ARGUMENTS

A. Summary of Amendments

The application still contains 50 claims.

Claims 1, 17, 33, 49 and 50 have been amended to clarify the subject matter being claimed.

Claims 8-16, 24-32, 40 and 42-48 have been amended to correct certain minor informalities detected by the Applicant and, in the case of claims 12-13, 28-29 and 32, to correct the claim dependency.

In the specification, paragraphs have been amended in order to align the *Summary of the Invention* section with the claimed invention and to correct certain minor informalities detected by the Applicant.

In the drawings, Figures 15 and 25 have been amended to correct certain minor informalities identified by the Applicant.

The Applicant respectfully submits that support for the amendments to the claims, specification and drawings exists in the specification as originally filed and that no new matter has been added to the application by the present amendment. More specifically, support for the amendments to independent claims 1, 17, 33, 49 and 50 may be found in the description at page 10, lines 15-20, page 11, lines 4-10, page 12, lines 18-25, page 13, lines 14-23 and page 15, line 26 to page 16, line 2.

B. Summary of Rejections and Reply

In the Office Action, the Examiner has rejected former claims 1-5 and 7-20 under 35 USC §102(b) as being anticipated by U.S. Patent No. 5,042,499 (hereinafter Frank et al.). Furthermore, the Examiner has rejected former claims 1, 15, 17, 19 and

29-31 under 35 USC §102(e) as being anticipated by U.S. Patent No. 5,520,176 (hereinafter Cohen).

The Examiner has also raised several different rejections of the former claims of the present application under 35 USC §103(a), as follows:

- claims 5, 6, 21, 22, 33 and 35-39 as being unpatentable over Frank et al.;
- claims 1, 6, 17, 22, 33-43 and 45-48 as being unpatentable over U.S. Patent Application Publication No. 2003/0208128 A1 (hereinafter Hamilton et al.);
- claims 33 and 35 as being unpatentable over Cohen;
- claims 2, 18 and 44 as being unpatentable over Cohen in view of U.S. Patent Application Publication No. 2003/0060690 A1 (hereinafter Jelliffe et al.).

The Applicant respectfully disagrees with the above rejections and submits that the subject matter of former claims 1-50 was patentably distinguishable over the cited prior art. However, in the interest of hastening allowance of the present application, the Applicant has amended the claims in order to clarify the subject matter being claimed therein. The subject matter of claims 1-50 as amended is believed to be both novel and non-obvious over the cited prior art references, as discussed below.

Hamilton et al.

With regard to the Hamilton et al. reference cited by the Examiner, the Applicant respectfully requests withdrawal of any and all rejections based thereon. The Hamilton et al. patent application, which was originally filed May 3, 2002 under serial no. 10/138,303, issued as U.S. Patent No. 6,907,284 on June 14, 2005 and is owned by LMS Medical Systems Ltd. The Applicant respectfully submits that the subject matter of the present application, at the time this subject matter was invented, was subject to an obligation of assignment to LMS Medical Systems Ltd. This obligation of assignment is evidenced by the copy of the recorded Assignment document enclosed herewith in Appendix B, by virtue of which the inventors assigned all of their rights to LMS Medical Systems Ltd. At the time the subject matter of the present application

was invented, U.S. Patent Application Publication No. US 2003/0208128 A1 (U.S. Patent No. 6,907,284) was also owned by LMS Medical Systems Ltd. Accordingly, the Applicant respectfully requests that U.S. Patent Application Publication No. US 2003/0208128 A1 (U.S. Patent No. 6,907,284), found by the Examiner to be applicable under 35 U.S.C. 103 via 35 U.S.C. 102(e), be excluded as prior art under 35 U.S.C. 103(c) with regard to the present application.

Claims 1, 17, 33, 49 and 50

The Examiner's attention is directed to the following highlighted features of independent claims 1, 17, 33, 49 and 50 as amended:

1. A method for segmenting a heart rate signal to identify heart rate feature events, said method comprising:
   a) receiving a heart rate signal including a sequence of sample points;
   b) processing said heart rate signal to generate a set of segments, **each segment corresponding to a respective portion of said heart rate signal identified as being enclosable in a respective bounded area** commencing at a start sample point of said heart rate signal and terminating at an end sample point of said heart rate signal, the sample points between said start sample point and end sample point lying within said bounded area, **wherein the bounded area for each segment has a respective length determined on a basis of at least one characteristic of the respective portion of said heart rate signal**;
   c) **processing said heart rate signal together with said set of segments to identify a plurality of distinct sections of said heart rate signal, each section being associated with a respective heart rate feature**;
   d) releasing a signal indicative of said plurality of sections of said heart rate signal.

17. An apparatus for segmenting a heart rate signal to identify heart rate feature events; said apparatus comprising:
   a) an input for receiving a heart rate signal including a sequence of sample points;
   b) a first processing unit coupled to said input, said first processing unit being adapted for processing said heart rate signal to generate a set of segments, **each segment corresponding to a respective portion of said heart rate signal identified as being enclosable in a respective bounded area** commencing at a start sample point of said heart rate signal and terminating at an end sample point of said heart rate signal, the sample points between said start sample point and end sample point lying within said bounded area, **wherein the bounded area for each segment has a respective length determined on a basis of at least one characteristic of the respective portion of said heart rate signal**;

c) a second processing unit coupled to said first processing unit, said second processing unit being adapted for **processing said heart rate signal together with said set of segments to identify a plurality of distinct sections of said heart rate signal, each section being associated with a respective heart rate feature**;
d) an output for releasing a signal indicative of said plurality of sections of said heart rate signal.

33. A computer readable storage medium including a program element suitable for execution by a computing apparatus for segmenting a heart rate signal to identify heart rate feature events, said computing apparatus comprising:
a) a memory unit;
b) a processor operatively connected to said memory unit, said program element when executing on said processor being operative for:
i. receiving a heart rate signal including a sequence of sample points;
ii. processing said heart rate signal to generate a set of segments, **each segment corresponding to a respective portion of said heart rate signal identified as being enclosable in a respective bounded area** commencing at a start sample point of said heart rate signal and terminating at an end sample point of said heart rate signal, the sample points between said start sample point and end sample point lying within said bounded area, **wherein the bounded area for each segment has a respective length determined on a basis of at least one characteristic of the respective portion of said heart rate signal**;
iii. **processing said heart rate signal together with said set of segments to identify a plurality of distinct sections of said heart rate signal, each section being associated with a respective heart rate feature**;
iv. releasing a signal indicative of said plurality of sections of said heart rate signal.

49. A fetal monitoring system comprising:
a) a sensor for receiving a signal indicative of a fetal heart rate;
b) an apparatus suitable for monitoring the condition of a fetus, said apparatus comprising:
i. an input coupled to said sensor for receiving said signal indicative of a fetal heart rate;
ii. a feature detection module coupled to said input, said feature detection module implementing:
(a) a first processing unit adapted for processing said heart rate signal to generate a set of segments, **each segment corresponding to a respective portion of said heart rate signal identified as being enclosable in a respective bounded area** commencing at a start sample point of said heart rate signal and terminating at an end sample point of said heart rate signal, the sample points between said start sample point and end sample point lying within said bounded area, **wherein the bounded area for each segment has a respective length determined on a basis of at least one characteristic of the respective portion of said heart rate signal**;

(b) a second processing unit adapted for **processing said heart rate signal together with said set of segments to identify a plurality of distinct sections of said heart rate signal, each section being associated with a respective heart rate feature**;

iii. a post processing module coupled to said feature detection module, said post processing module being adapted for deriving information on the basis of the heart rate features associated with said sections of said heart rate signal;

iv. an output for releasing the information derived from the heart rate features associated with said sections of said heart rate signal;

c) an output unit coupled to the output for said apparatus, said output unit being suitable for displaying the information derived from the heart rate features associated with said sections of said heart rate signal.

50. An apparatus for segmenting a heart rate signal to identify heart rate feature events, said apparatus comprising:

a) means for receiving a heart rate signal including a sequence of sample points;

b) means for processing said heart rate signal to generate a set of segments, **each segment corresponding to a respective portion of said heart rate signal identified as being enclosable in a respective bounded area** commencing at a start sample point of said heart rate signal and terminating at an end sample point of said heart rate signal, the sample points between said start sample point and end sample point lying within said bounded area, **wherein the bounded area for each segment has a respective length determined on a basis of at least one characteristic of the respective portion of said heart rate signal**;

c) means for **processing said heart rate signal together with said set of segments to identify a plurality of distinct sections of said heart rate signal, each section being associated with a respective heart rate feature**;

d) means for releasing a signal indicative of said plurality of sections of said heart rate signal.

The Applicant respectfully submits that the subject matter of amended independent claims 1, 17, 33, 49 and 50 is neither anticipated nor rendered obvious by the cited prior art. Without limiting the generality of the foregoing, the Applicant submits that the above-emphasized features of claims 1, 17, 33, 49 and 50 are neither taught nor suggested by Frank et al., Cohen or Cohen in combination with Jelliffe et al. More specifically, none of the prior art references teach or suggest segmenting a heart rate signal to identify heart rate feature events by: (1) processing the heart rate signal to generate a set of segments, **each segment corresponding to a respective portion of the heart rate signal identified as being enclosable in a respective bounded area, where the bounded area for each segment has a respective length determined on**

a basis of at least one characteristic of the respective portion of the heart rate signal; and (2) **processing the heart rate signal together with the set of segments to identify a plurality of distinct sections of the heart rate signal, each section being associated with a respective heart rate feature.**

Frank et al. is directed to a method and apparatus for obtaining and displaying instantaneous fetal heart rate and fetal heart rate beat-to-beat variability. More specifically, Frank et al. discloses a fetal heart rate monitor that can adaptively cancel in real-time the maternal electrocardiogram from an abdominal signal to provide an accurate record of fetal heart rate and beat-to-beat variability (see col. 4, lines 62-68, col. 7, lines 5-26 and Fig. 8).

At page 2 of the Office Action, the Examiner contends that Frank et al. teaches "processing the heart rate signal to generate a set of segments" at col. 4, lines 24-31 and that each "segment being formed by enclosing a portion of said heart rate signal in a respective bounded area " in Fig. 8 and at col. 6, lines 40-44. The Examiner also contends that Frank et al. teaches "processing the set of segments to generate a plurality of sections, each section being indicative of a heart rate feature" at col. 1, lines 13-23 and in Fig. 8.

The Applicant respectfully disagrees with these findings by the Examiner and invites the Examiner to revisit the Frank et al. reference, since Frank et al. do not teach or suggest the above-indicated features either in the paragraphs and figures identified by the Examiner or anywhere else in the document. The paragraphs of Frank et al. cited by the Examiner discuss the accurate noninvasive measurement of instantaneous fetal heart rate and fetal heart rate variability, the handling of digital signals (including storing and digitally sampling such signals), the use of a maternal cancellation time window to cancel in real-time the maternal electrocardiogram from an abdominal signal and the use of a seven-segment display to concurrently display fetal heart rate, variability, uterine activity and maternal heart rate. The figure cited by the Examiner, notably Figure 8, illustrates voltage-time graphs in which one tracing 25 represents maternal ECG data (including fetal ECG data and background noise) and another

tracing 23 represents the fetal ECG data after cancellation of each and every maternal ECG complex. The tracings are shown plotted on standard ECG graph paper, which includes regularly spaced horizontal and vertical lines.

The Applicant respectfully submits that it is nowhere mentioned or suggested in Frank et al. to *process the heart rate signal for generating a set of segments, each segment corresponding to a respective portion of the heart rate signal identified as being enclosable in a respective bounded area*, as claimed in independent claims 1, 17, 33, 49 and 50 of the present application. It follows that Frank et al. do not teach or suggest that *the bounded area for each segment has a respective length determined on a basis of at least one characteristic of the respective portion of the heart rate signal*. It also follows that Frank et al. do not teach or suggest that *the heart rate signal is processed together with the set of segments to identify a plurality of distinct sections of the heart rate signal, each section being associated with a respective heart rate feature.*

Cohen discloses a sleep analysis system for analysing a sleep episode of a subject based on measured values of a plurality of parameters characterising that subject, including the subject's heart rate. In Fig. 3C, Cohen illustrates a portion of a signal over time from an electrocardiograph for a subject during a sleep episode after digitization. The boxes appearing in Fig. 3C are simply used to show the brady-cardiac event portion of the corresponding brady arrhythmia-tachy arrhythmia complex significant event. These significant events in the heart rate signal are identified by monitoring the subject's average heart rate to determine when the change in average heart rate meets two sets of predefined criteria, as described by Cohen at column 6, lines 36-53.

At page 6 of the Office Action, the Examiner contends that, in Figs. 1, 3A-3H and 4, Cohen teaches "processing the heart rate signal to generate a set of segments", where each segment is "formed by enclosing a portion of said heart rate signal in a respective bonded area". The Examiner also contends that Cohen teaches "processing the set of segments to generate a plurality of sections, each section being indicative of a heart rate feature" at col. 3, lines 45-50.

The Applicant respectfully disagrees with these findings by the Examiner and invites the Examiner to revisit the Cohen reference, since Cohen do not teach or suggest the above-indicated features either in the paragraphs and figures identified by the Examiner or anywhere else in the document. The figures and paragraphs of Cohen cited by the Examiner reveal the processing of digitised samples of a heart rate signal in order to extract therefrom occurrences of a particular significant event, where these significant events identified in the heart rate signal are shown on a display by means of boxes formed around the relevant sections of the heart rate signal.

The Applicant respectfully submits that it is nowhere mentioned or suggested in Cohen to *process the heart rate signal for generating a set of segments, each segment corresponding to a respective portion of the heart rate signal identified as being enclosable in a respective bounded area, where the bounded area for each segment has a respective length determined on a basis of at least one characteristic of the respective portion of the heart rate signal*, as claimed in independent claims 1, 17, 33, 49 and 50 of the present application. Since Cohen is focused solely on identifying brady arrhythmia-tachy arrhythmia complex significant events in the heart rate signal, which can be identified by determining when the change in average heart rate meets two sets of predefined criteria, there is no suggestion (and clearly no need) in Cohen for the heart rate signal to be segmented by identifying portions of the heart rate signal that are enclosable in respective bounded areas. It follows that Cohen does not teach or suggest that *the heart rate signal is processed together with the set of segments to identify a plurality of distinct sections of the heart rate signal, each section being associated with a respective heart rate feature.*

Jelliffe et al. is directed to a system and machine of patient monitoring of various parameters and decision support that is guided by a stochastically analyzed operation. This operation can evaluate and optimize the therapy that is used especially in difficult situations. The Applicant respectfully submits that it is nowhere mentioned or suggested in Jelliffe et al. to *process the heart rate signal for generating a set of segments, each segment corresponding to a respective portion of the heart rate signal*

identified as being enclosable in a respective bounded area, as claimed in independent claims 1, 17, 33, 49 and 50 of the present application. It follows that Jelliffe et al. do not teach or suggest that *the bounded area for each segment has a respective length determined on a basis of at least one characteristic of the respective portion of the heart rate signal*. It also follows that Jelliffe et al. do not teach or suggest that *the heart rate signal is processed together with the set of segments to identify a plurality of distinct sections of the heart rate signal, each section being associated with a respective heart rate feature*.

In light of the foregoing, the Applicant respectfully submits that the cited prior art references, whether taken alone or in combination, do not explicitly disclose or implicitly suggest all of the limitations of independent claims 1, 17, 33, 49 and 50, as amended. Accordingly, the subject matter of claims 1, 17, 33, 49 and 50 is believed to be both novel and non-obvious over the cited prior art and, as such, in condition for allowance.

Claims 2-16, 18-32 and 34-48

New claims 2-16, 18-32 and 34-48 depend directly or indirectly from one of independent claims 1, 17 and 33, and therefore incorporate all of the limitations recited in the respective independent claim, including those features already shown above to be absent from the cited prior art references. Accordingly, dependent claims 2-16, 18-32 and 34-48 are also believed to be novel and non-obvious over the cited prior art and, as such, in condition for allowance.

V. CONCLUSION

In view of the above, it is submitted that claims 1-50 are in condition for allowance. Reconsideration of the rejections is requested. Allowance of claims 1-50 at an early date is solicited.

If the application is not considered to be in full condition for allowance, for any reason, the Applicant respectfully requests the constructive assistance and suggestions of the Examiner in drafting one or more acceptable claims pursuant to MPEP 707.07(j) or in making constructive suggestions pursuant to MPEP 706.03 so that the application can be placed in allowable condition as soon as possible and without the need for further proceedings.

Respectfully submitted,

KENYON & KENYON LLP

Dated: 28 Oct 2006

By: _____
Michelle Carniaux
Reg. No. 36,098

One Broadway
New York, NY 10004
(212) 425-7200

CUSTOMER NO. 26646

APPENDIX A

Replacement Drawing Sheets 14/28 and 22/28
Annotated Drawing Sheets 14/28 and 22/28